

**REMARKS**

Claims 1-13 and 15 were presented for examination. Claims 1-13 and 15 were rejected. Claims 1, 2, 4, 8-10, 12 and 13 have been amended. Support for the amendment can be found on page 2, [0006]; page 4, [0012]; page 5, [0016]; page 6, [0017]; page 7, [0024]; page 8, [0027], page 9-10, [0031]; page 11, [0035] and in Figs 2A and 4A. No new matter has been added.

**Rejections Under 35 U.S.C. § 112**

Claims 1, 2, 4, 12 and 13 were rejected under 35 U.S.C. § 112, first paragraph as failing to comply with the written description requirement.

Claims 1, 2, 4, 12 and 13 have been amended to provide a range of resonant frequency support by the specification. Namely, a lower range of 500 Hz was disclosed on page 11, [0035] and an upper range of 5 kHz was disclosed on page 2, [0006] (a cantilever with a 500 kHz resonant frequency) and page 5, [0016] (the resonant frequency of the stage is preferably 1/100<sup>th</sup> that of the resonant frequency of the probe). Applicants believe that claims 1, 2, 4, 12 and 13 are in compliance with the written description requirement and request the withdrawal of the rejection to claims 1, 2, 4, 12 and 13.

**Rejections Under 35 USC §103(a)**

Claims 1, 2, 4, 12 and 13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Funakubo in view of Watanabe et al and in further view of Barrett. Applicants respectfully traverse.

Claim 1 recites "a fast scanning stage for a scanning probe microscope, said scanning probe microscope including a probe, said fast scanning stage comprising, a fixed support, and a sample stage having at least one axis of translation, said sample stage being affixed to said fixed support by means for causing displacement of said sample stage relative to said probe, wherein said means for causing displacement comprises actuator elements extending between said fixed support and said sample stage and wherein said means for causing displacement is responsive to the application of a bias voltage of 100 volts or less and wherein said scanning probe microscope is a fast atomic force microscope

(AFM) with a scanning stage resonance frequency between about 500 Hz to about 5 kHz."

Funakubo recites an oscillation type stage device. However, Funakubo fails to disclose the "a fast atomic force microscope (AFM) with a scanning stage resonance frequency between about 500 Hz to about 5 kHz." Funakubo is silent on the use of fast AFM. Watanabe relates to scanning tunneling microscopy. However, Watanabe also fails to disclose "a fast atomic force microscope (AFM) with a scanning stage resonance frequency between about 500 Hz to about 5 kHz." Even though Watanabe indicates that AFM may be used (Col. 16, lines 16-17), Watanabe does not disclose the use of *fast* AFM in the specified range. Barrett also discloses a scanning probe microscope but also fails to disclose "a fast atomic force microscope (AFM) with a scanning stage resonance frequency between about 500 Hz to about 5 kHz." Instead, Barrett discloses a single resonant frequency of 2kHz and provides no suggestion or motivation to use a resonant frequency higher or lower than 2 kHz. Therefore, Funakubo, Watanabe and Barrett do not disclose the claimed feature. Nor does the hypothetical combination of Funakubo, Watanabe and Barrett suggest or teach "a fast atomic force microscope (AFM) with a scanning stage resonance frequency between about 500 Hz to about 5 kHz."

Additionally, claim 1 recites "actuator elements extending between said fixed support and said sample stage." Funakubo, Watanabe and Barrett all fail to disclose more than one actuator element that extend between a fixed support and the sample stage. Funakubo discloses one actuator expending between a fastening section and a plate screen (Fig. 1, elements 16, 18 and 19; Figs 2-7, element 36, 38 and 39). Watanabe discloses at least two elements joined together by holding elements that form a connection between the base and sample holder (Col. 8, lines 24-46; Col. 9, line 60-68; Figs. 1, 2 and 6). Finally, Barrett discloses tubular scanners positioned at the corners of a scanning stage to provide movement in the z-direction (Col. 3, lines 25-44; Fig. 1). Therefore, Funakubo, Watanabe and Barrett do not disclose the claimed feature. Nor does the hypothetical combination of Funakubo, Watanabe and Barrett suggest or teach "actuator elements extending between said fixed support and said sample stage." Because the hypothetical combination of Funakubo, Watanabe, and Barrett does not suggest or teach all the limitations of the claimed invention, Applicants submit that claim 1 is patentable over the prior art and

request the withdrawal of the rejection to claim 1.

Independent claims 2 and 13 also recite "a fast atomic force microscope (AFM) with a scanning stage resonance frequency between about 500 Hz to about 5 kHz" and "actuator elements extending between said fixed support and said sample stage" as recited in claim 1. Therefore, for the same reasons discussed above, Applicants submit that claims 2 and 13 are patentable over the prior art, and requests the withdrawal of the rejection of claims 2 and 13.

Claim 4 recites "A fast scanning stage for a scanning probe microscope, said scanning probe microscope including a probe, said fast scanning stage comprising a fixed support and a sample stage having at least one axis of translation, said sample stage being affixed to said fixed support by actuator elements extending between said fixed support and said sample stage, a sine waveform generator for actuating said actuator elements, in which said sample stage is displaced by said actuator elements being driven at the frequency of resonant vibration through the application of a bias voltage of 100 volts or less corresponding to translation of said sample stage with respect to said probe, wherein said scanning probe microscope is a fast atomic force microscope (AFM) with a scanning stage resonance frequency between about 500 Hz to about 5 kHz."

As discussed above, Funakubo, Watanabe and Barrett do not disclose the "a fast atomic force microscope (AFM) with a scanning stage resonance frequency between about 500 Hz to about 5 kHz." Nor does the hypothetical combination of Funakubo, Watanabe and Barrett suggest or teach "a fast atomic force microscope (AFM) with a scanning stage resonance frequency between about 500 Hz to about 5 kHz."

Further, claim 4 recites "said sample stage being affixed to said fixed support by actuator elements extending between said fixed support and said sample stage." Also, as discussed above, Funakubo, Watanabe and Barrett do not disclose this claimed feature. Nor does the hypothetical combination of Funakubo, Watanabe and Barrett suggest or teach "actuator elements extending between said fixed support and said sample stage." Because the hypothetical combination of Funakubo, Watanabe, and Barrett does not suggest or teach all the limitations of the claimed invention, Applicants submit that claim

4 is patentable over the prior art and request the withdrawal of the rejection to claim 4.

Independent claim 12 also recites "a fast atomic force microscope (AFM) with a scanning stage resonance frequency between about 500 Hz to about 5 kHz" and "said sample stage being affixed to said fixed support by actuator elements extending between said fixed support and said sample stage" as recited in claim 4. Therefore, for the same reasons discussed above, Applicants submit that claim 12 is patentable over the prior art, and requests the withdrawal of the rejection of claim 12.

Claims 3, 5 and 6 were rejected under 35 USC §103(a) as being unpatentable over Funakubo in view of Watanabe et al and Barrett as applied to claim 2, and in view of Sarkar. Applicants respectfully traverse.

Claims 3, 5 and 6 depend from the independent claim 2 either directly or ultimately. These dependent claims are patentable for the same reasons as presented above with respect to the claims from which they depend. Further, the dependent claims also include additional features that distinguish them from the prior art. For example, claim 3 recites that "said sample stage comprise four actuator elements supporting said sample stage." Funakubo fails to disclose four actuator elements and Sarkar fails to disclose four actuator elements that support the sample stage. In contrast, Sarkar discloses four actuators (Fig. 2, elements 203a-d) coupled to four flexures (Fig. 2, elements 201a-d) that are then connected to a stage (Fig. 2, element 202). Therefore, Applicants submit that claims 3, 5 and 6 are also patentable over the prior art and request the withdrawal of the rejection thereof.

Claim 7 was rejected under 35 USC §103(a) as being unpatentable over Funakubo in view of Watanabe et al, Barrett, and Sarkar as applied to claim 6, and in view of Pai et al. Applicants respectfully traverse this rejection.

Claim 7 ultimately depends from independent claim 2. This dependent claim is patentable for the same reasons as presented above with respect to the claim from which it depends. Therefore, Applicants submit that claim 7 is also patentable over the prior art and request the withdrawal of the rejection thereof.

Claim 8 was rejected under 35 USC § 03(a) as being unpatentable over Funakubo in view of Watanabe et al and Barrett as applied to claim 2, and in view of Elings. Applicants respectfully traverse.

Claim 8 directly depends from independent claim 2. This dependent claim is patentable for the same reasons as presented above with respect to the claim from which it depends. Therefore, Applicants submit that claim 8 is also patentable over the prior art and request the withdrawal of the rejection thereof.

Claims 9 and 10 were rejected under 35 USC §103(a) as being unpatentable over Funakubo in view of Watanabe et al and Barrett as applied to claims 2 and 3 and in view of Zdeblick. Applicants respectfully traverse.

Claim 9 and 10 depend from independent claim 2 either directly or ultimately. This dependent claim is patentable for the same reasons as presented above with respect to the claims from which it depends. Further, the dependent claim also recites additional features that distinguish it from the prior art. For example, claims 9 and 10 disclose that "at least one of said actuator elements comprises a PZT bimorph." Funakubo does not disclose a PZT biomorph actuator and Zdeblick does not disclose a stage supporting actuator element. Therefore, Applicants submit that claim 9 is also patentable over the prior art and request the withdrawal of the rejection thereof.

Claim 11 was rejected under 35 USC §103(a) as being unpatentable over Funakubo in view of Watanabe et al and Barrett as applied to claim 1, and in view of Marchman. Applicants respectfully traverse this ground of rejection.

Claim 11 directly depends from independent claim 1. This dependent claim is patentable for the same reasons as presented above with respect to the claim from which it depends. Further, the claim 11 also recites additional features that distinguish it from the prior art. For example, both Funakubo and Marchman fail to disclose a "sample stage ... comprised of a material selected from the group consisting of ... heat resistant polymers, and anodized aluminum." Therefore, Applicants submit that claim 11 is also patentable

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over the prior art and request the withdrawal of the rejection thereof.

Claim 15 was rejected under 35 USC §103(a) as being unpatentable over Funakubo in view of Watanabe et al and Barrett as applied to claim 13 and in view of the publication of Ando et al. Applicants respectfully traverse this ground of rejection.

Claim 15 directly depends from the independent claim 13. This dependent claim is patentable for the same reasons as presented above with respect to the claim from which it depends. Therefore, Applicants assert that claim 15 is also patentable over the prior art and request the withdrawal of the rejection thereof.

#### Conclusion

For the above reasons, Applicants respectfully submit that the above claims as amended represent allowable subject matter. The Examiner is encouraged to contact the undersigned to resolve efficiently any formal matters or to discuss any aspects of the application or of this response. Otherwise, early notification of allowable subject matter is respectfully solicited.

Respectfully submitted,  
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